Chapter 5

ISD CONSIDERATIONS FOR TRADITIONAL MEDIA

Overview

Introduction

This chapter describes ISD considerations for the analysis, design, development, implementation, and evaluation of traditional media.

Where to Read About It

This chapter contains four sections:

Section	Title	See Page
A	Print Materials	146
B	Videotape	154
C	Audiotape	164
D	Audioconferencing	174

References

The material in this chapter is based on the following references:

- MIL-PRF-29612, *Training Data Products*
- MIL-HDBK-29612-1, *Department of Defense Handbook, Guide for Acquisition of Training Data Products and Services*
- MIL-HDBK-29612-2, *Department of Defense Handbook, Instructional Systems Development/Systems Approach to Training and Education*
- MIL-HDBK-29612-3, *Department of Defense Handbook, Development of Interactive Multimedia Instruction (IMI)*
- MIL-HDBK-29612-4, *Department of Defense Handbook, Glossary of Training Terms*
- *Distance Learning Curriculum Analysis and Media Selection,* Air University, Maxwell AFB, AL, 4 Feb 1994
- *ECI Guide for Authors*, 1997, Fourteenth Edition, web site: *http://www.au.af.mil/au/oas/eci/eciproto.htm*
- *Government Printing Office (GPO) Style Guide*
- AF Handbook 36-2235, *Information for Designers of Instructional Systems, Volume 4*
- AF Manual 36-2234, *Instructional Systems Development*
- AFDLO Home Page web site: *http://www.au.af.mil/afdlo*
- AFH 37-137, *The Tongue and Quill*
- AFI 37-160, *Air Force Publications and Forms Management Programs – Guide for Proponents of Air Force Publications, Volume 5*
- AFM 37-126, *Preparing Official Publications*
- *AU Style Guide*, web site: *http://www.au.af.mil/au/oas/aupress/style/*

Section A

Print Materials

Analysis Considerations

Why Use Print Materials?

Most current instruction is still accomplished primarily or in conjunction with printed documents and materials. Print materials will always have an important role in the delivery of instruction.

Print materials serve as a basis for student learning by providing information, facts, examples, and explanations. Examples of print items include placards, flip charts, illustrated booklets, and photographs. Print is also highly transportable and suitable for self-instruction by students at any location. Technologies are emerging that facilitate the production of materials by course developers.

When to Use Print Materials

Print materials can be used to deliver:

- An entire course of instruction that is based on cognitive (knowledge) learning objectives (i.e., correspondence courses).
- Combined with other instructional technologies as collateral material for any type of course.

Since print materials are passive in nature and can only provide knowledge-based instruction, they would not be appropriate as the primary media for accomplishing learning objectives that require performance skills or a high level of interactivity and communication with others. Print instruction is most effective when it is integrated with other types of media and instruction.

General applications of print materials include:

- Study Guides
- Textbooks
- Manuals, Workbooks and outlines
- Instructor/student guides
- Documents
- Illustrated booklets/handouts
- Case studies
- Scripts
- Assignments and schedules
- Tests, quizzes, and critiques
- Pictures, drawings, and graphics

Continued on the next page

Analysis Considerations (continued)

Print Resource Requirements and Constraints

It is important to identify and assess the print resource requirements and constraints. This will help to determine the feasibility of using print instruction, and whether or not the print materials should be produced in-house.

- **Equipment.** Minimum required equipment would include a PC (with a word processing/desktop publishing application), high quality laser printer, and a collating copy machine. Optional: Color-capable printer and copier.
- **Facilities.** As a minimum, an office would be required with the minimum equipment to produce the instruction.
- **Funding.** Is there a budget? This factor will determine if outsourcing is an option.
- **Personnel.** Minimum recommended personnel would include a Subject Matter Expert (SME), writer, editor, and publisher. These would not necessarily be different individuals. In some situations, they may be one and the same person.
- **Time.** Is there a time limit? Since the potential requirement exists for the development and production of complete textbooks, manuals, etc., which can be complex and time consuming, time is a significant factor. Large in-house print production efforts usually take longer than anticipated.

In-House Development or Outsource?

With the current availability of powerful, user-friendly desktop publishing software, the capability to produce *professional-looking* print materials is now available to any user. However, to produce *professional-quality* print materials, special designing, writing, editing and publishing skills are still required. Therefore, if *quality* is an issue and funding is available, consider using professional publishing personnel.

For most applications, well-written print materials developed in-house will effectively meet instructional requirements. The only outside assistance that may be required is the reproduction of copies for distribution. However, for the larger and more complex instructional textbooks and manuals, a significant amount of time and effort will be required to complete the task. This may necessitate outsourcing some or all of the effort if unit personnel will not have the time to produce the materials in-house.

At times, a “mix” of in-house developed materials and external resources (i.e., stock photography) can be used to produce high quality materials.

Design Considerations

Determine the Objectives

Determine the specific knowledge and attitude objectives that must be achieved. Decide what it is you want to do and accomplish with the print materials.

Determine What Approach to Use

Determine whether the print materials will be developed as the primary instructional media, or used as collateral instruction for other media.

Based on how the print instruction will be used, determine what type of print materials should be employed to meet the specific learning objectives (e.g., textbook, workbook, student guide)?

Design Strategy

Determine the design strategy. Because print instruction is mostly self-directed and self-paced, the print materials should be designed to motivate, stimulate, and hold the attention and interest of the student.

Determine what type of test and evaluation methods should be used to measure the students' comprehension of the instruction provided. AF HDBK 36-2235, Volume 12, *Test and Measurement Handbook*, provides general guidance.

General Design Guidelines

Before designing the print materials, you should be aware of the students' reading skills and knowledge level of the subject material. Consider the following guidelines when designing print materials:

- The print instruction should facilitate creative thinking, encourage self-instruction, maximize interaction, and provide a means for self-assessment.
- The print instruction should be performance-oriented - it should tell the students what they need to know and what to do.
- The print instruction should use the full presentation capabilities of print materials (pictures, diagrams, graphics, color and text).
- The print instruction should be provided in manageable chunks.
- The print instruction should correlate with other media instruction provided.

Continued on the next page

Design Considerations (continued)

What to Do

- Use plain conversational English.
- Use the active voice and personal pronouns.
- Use short sentences.
- Use a logical sequence for paragraphs and sentences (e.g., general then specific, right ways then wrong ways, advantages then disadvantages).
- Use examples and illustrations to link the familiar with the unfamiliar.
- Use pictures to show spatial relationships and object form.
- Use questions that focus on student understanding to help them identify important material and make the desired inferences.
- Use humor constructively to improve student retention and interest.
- Use the same format throughout - be consistent.
- Use eye-pleasing layout with lots of "white space."

What Not to Do

- Avoid irrelevant information and verbosity.
- Avoid compound sentences.
- Avoid complex and difficult words.
- Avoid double negatives.
- Avoid jargon.
- Avoid gender terms.

Develop an Outline

Determine how the content will be organized and structured based on the objectives and purpose of the instruction. Then develop an outline of the material to be covered before you start working on any of the content.

Get Approval

Once you have developed an outline, you should probably get the necessary coordination, evaluation, and approval of the outline and design strategy before proceeding.

Development Considerations

Where to Go for Guidance

The following Internet sites can be accessed to obtain information on AF and AETC publications, handbooks, instructions, etc., that provide guidance related to the development of documentation.

- *http://afpubs.hq.af.mil*
- *http://www.aetc.af.mil/m/*

You will also need to consult any applicable MAJCOM, Numbered Air Force, and local unit publications for guidance.

If the print materials will be used as the primary instructional media for a correspondence type course, you should contact ECI for initial guidance and reference information.

Gathering Information

The amount of time and effort that will be required to research the subject and gather the required information will most likely depend on the type(s) of print materials being developed (textbook, workbook, study guide, lesson outline, etc.). This is the key function in development process, so make sure sufficient time is planned and allocated to do this.

If you are not the SME, then you will be working with a SME during the development of the instruction. The SME is usually the primary source of information. However, solicit inputs and information from other sources such as the training manager, technical experts, the other services and DoD agencies as applicable. Also, review any existing courseware and technical/training materials.

Develop a Draft

If you are writing the instruction yourself and you are not somewhat proficient in using a PC or word processing application, then you are already in trouble! Plan ahead and obtain any necessary support or training.

While developing the draft, keep focused on the specific learning objectives and make sure the content is relevant and useful. Develop test questions and evaluation tools that will effectively measure the students' knowledge of the required material, provide feedback, and meet the specific learning objectives.

When the initial draft is complete, you may want to consider conducting an internal review prior to the formal review and coordination process. For an internal review, get as many eyes as possible to look at the material. If feasible, include disinterested third party people who do not have a stake in the product.

Continued on the next page

Development Considerations (continued)

Final Review, Editing, and Approval	Conduct a summative evaluation and make any necessary changes or edits to the material. If the preceding analysis, design, and development processes were accomplished properly, then very few changes will probably be required at this stage in the game. Finally, go and get approval.

Implementation Considerations

Print Copy Reproduction	Determine if unit reproduction support or contract services are already available to accomplish this task. If they are not, you will need to determine if the capability exists to reproduce the print materials in-house, and whether it would be cost-effective to do so. A high quality laser printer will normally be required to produce a camera-ready master copy of the printed materials for reproduction. Also, a high speed collating copy machine should be used if the multiple copies will be made in-house to minimize the time and effort required. If color copies are required, access to a color printer and copier will be required unless commercial support is used.
Electronic Copy Reproduction	Most units have established procedures, standards, and/or methods for the format and electronic reproduction of courseware materials. You will need to check with the unit administration or training personnel for information. Many print shops are now capable of generating print materials from electronic files. Consult with your print shop before formatting and laying out the materials. The print shop may designate required formats for text, graphics, and other items. They may also recommend the best way to organize the document into a master file and sub files.
Distribution	Once again, most units have established procedures and methods for the distribution of formal courseware materials, to include electronic versions. Assuming that you will not be responsible for the actual distribution of the materials, you should still make sure, as a minimum, that the distribution list is current.

Evaluation Considerations

Evaluation of Print Instruction

As with other instructional technologies, the evaluation process for print instruction consists of a formative, summative, and operational evaluation. If the print materials were developed as supporting instruction for other instructional media, then these materials should be evaluated as part of the primary lesson/course evaluation.

The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and its supporting handbooks.

This section addresses the special considerations for conducting evaluations of print materials when developed as the primary instructional medium.

Formative Evaluation

The formative evaluation begins in the analysis phase and continues through the development phase of the ISD process. During the initial phases of development, the primary focus would be on the technical accuracy of the learning objectives, content, and test items.

Once draft versions of the materials are developed, individual and small group tryouts of the instruction can be accomplished. General areas to evaluate include:

- Instructional material organization, structure, and format.
- Content accuracy, relevancy, currency, effectiveness, completeness, spelling and grammar.
- Use, clarity, and effectiveness of pictures, graphics, diagrams, test questions, etc.
- Student comprehension and accomplishment of the learning objectives.

Results of these evaluations are used to revise and finalize the print materials.

Summative Evaluation

The operational tryouts for the summative evaluation of the print instruction should be conducted at various sites.

Continued on the next page

Evaluation Considerations (continued)

Operational Evaluation

The operational evaluation is an ongoing process that is accomplished after the formative and summative evaluations. This evaluation is based on internal and external feedback data such as:

- Instructor/facilitator comments (internal)
- Student critiques (internal)
- Test results (internal)
- Inspection and evaluation reports (external)

To ensure the quality of the instruction is maintained, conduct these evaluations on a regular basis. There is always room for improvement.

Section B

Videotape

Analysis Considerations

When to Use Videotape

In general, videotape would be appropriate for any instruction that requires visual communication with the student (visual cues, motion, actions, etc.). Videotape presentations can enhance, and help clarify, the instruction provided. It is an effective medium to use to reach large, widely distributed audiences.

Videotapes can be used:

- To support or reinforce other instruction by providing visual demonstrations of tasks, and showing actual equipment, locations, people, etc.
- To deliver instruction from instructors, technical experts, etc., that are not always available for live presentations at the various sites.
- When consistency/standardization of the instruction is required at all sites.

If videotapes are used alone as the primary instructional media, there is no guarantee that any learning will take place. For videotapes to be effective, other collateral instructional materials and activities should be used to reinforce the videotape instruction.

Videotape Resource Requirements and Constraints

It is important to identify and assess the videotape resource requirements and constraints. This will help to determine the feasibility of using videotape instruction, and whether or not the video production capability exists in-house.

- **Equipment.** Minimum required equipment would include video camera(s), video cassette/tape recorder, TV monitor, tripod, lighting equipment, microphones and headphones.
- **Facilities.** Can the taping be accomplished on site, or will a production studio be required? If a production studio will be used, is there one available in-house (e.g., IVT studio), or will a studio need to be rented?
- **Funding.** Is there a budget? This factor alone may determine if outsourcing is even an option.
- **Personnel.** This is a variable factor that may need to be limited based on available resources. Assuming that professional personnel are used, the production team may include a production manager, producer, director, editor, casting director, cast, camera crew, lighting/sound technicians, stage hands, makeup person, and various other assistants as desired.
- **Time.** Is there a time limit? Since video production can be complex and time consuming, time is a significant factor. In-house video productions almost always take longer than anticipated or planned.

Continued on the next page

Analysis Considerations (continued)

In-House Development or Outsource?	The production of professional quality videotapes requires years of experience. If quality is an issue and funding is available, consider using only professional production personnel. On the other hand, considering that the most important factor from an instructional standpoint is the content, a well-written script and a home video camera may fit the bill. Obviously, the answer will probably lie somewhere between these two. In any event, some or all of the effort may need to be outsourced if the required production resources are not available in-house.
Is Videotape Cost-Effective?	A good cost-effectiveness analysis will provide the answer. However, assuming that the videotape will in fact meet the required learning objectives, the initial cost, student throughput, and content stability will probably be the key factors in this determination. Therefore, make sure this data is accurate and valid.

Design Considerations

Preproduction

The design phase, or *preproduction* phase, encompasses all of the planning, design, and development that occurs prior to the actual filming.

Determine the Objectives

Determining the specific objectives or purpose of the videotape is critical since all of the following efforts will be based on meeting those objectives. Decide what it is you want to do and accomplish with the videotape instruction. It may be necessary to limit the scope or purpose in order to effectively cover the required subject/topic in the time allotted.

Determine What Approach to Use

Solicit ideas and inputs from others to help decide what approach to take. There are many different approaches or presentation formats that can be used to deliver the instruction such as:

- Lecture
- Demonstration
- Dramatization
- Interview or group discussion
- Game or talk show
- Question and answer
- Event walk-through

Determine what type of test and evaluation methods should be used to measure the students' comprehension of the instruction provided. AF HDBK 36-2235, Volume 12, *Test and Measurement Handbook*, provides general guidance.

General Design Guidelines

When designing the instruction, keep focused on the objectives of the videotape. Following are some general design guidelines:

- Plan to keep the program or program segment as short as possible. Long videotaped programs will lose effectiveness since it is difficult to maintain the student's attention and interest. Ten minutes or less would be optimum.
- As with briefings and other presentations, limit your program or program segment to three major points if possible.
- Plan and design collateral activities that will require student actions or performance of tasks (i.e., hands-on activities).
- Employ the full presentation capabilities of video by using audio, real-time events, still/moving pictures, slow/fast motion, animation, color and text.
- Determine what supporting materials will be required (e.g., outlines, readings, quizzes), and how they will be used (before, during, or after).
- Plan some type of follow-on activities to reinforce the instruction provided such as group discussions, assignments, quizzes, etc.

Continued on the next page

Design Considerations (continued)

Develop a Script

The script provides the outline and guide for producing the video. Make sure it communicates exactly what you want said and done.

The script should:

- Focus on the objectives.
- Communicate and reinforce the major points.
- Deliver the instruction in a coherent and logical sequence.
- Be written in plain and simple conversational English. Remember the object here is to ensure the students understand what is said - not to impress them with your command of the English language!

Bottom line: Writing a good script takes time and practice.

Develop Storyboards

The storyboards are used to convey visual ideas and concepts. For videotape instruction, they need to show the sequence of the visual shots with the corresponding dialogue.

The general guidelines provided in Chapter 8 for developing IVT storyboards can also be applied to videotapes.

Determine Who and Where to Film

Two other planning decisions will need to made:

Who to shoot. That is, are you going to use real people or professional actors?

- Actors know the drill, but you will pay for their expertise.
- In most cases, real people will do if they are carefully selected (i.e., ensure that they are not only good speakers, but credible speakers).

Where to shoot (if not already determined). Will the filming be done on location or in a production studio?

- On location provides realism, to include all the real noise, lighting problems, distractions, etc., that will need to be dealt with for the shoot.
- Studio settings are more controlled which will reduce the time required to complete the shoot. However, this will probably be more costly if a studio has to be rented.

Get Approval

Make sure you know what the approval process/protocol is, and get the necessary approval before proceeding. The storyboards can be used in the review and approval process to get the "go-ahead" before committing the resources and starting the actual production.

Development Considerations

Production

The development phase, or *production* phase, involves the last minute preparations for the shoot, and the actual shoot itself. If a professional production team is used, many of the following preparation and filming considerations will not be concerns or issues. They are provided as information for inexperienced personnel and in-house productions.

Audio Preparations

Make sure that appropriate microphones will be used:

- Determine what type (unidirectional, bidirectional, or omnidirectional) and kind of microphones (floor/table stand, hanging, camera, lavaliere, handheld, wireless, etc.) are available for use.
- Select which type(s) and kind(s) of microphones will be used.
- If possible, test the microphone(s) on location to check audio levels and background noise.

Video Preparations

Determine how many cameras will be required and/or used:

- In most situations, only one camera (VHS, VHS-C, Beta, or Hi-8) will be necessary. The taping can be planned to continue uninterrupted during the production, with the editing performed after the shoot.
- More than one camera should be considered if an event that will be taped cannot be recreated or repeated.

Final Preparations for the Filming

The use of a production and equipment checklist will help to ensure smooth execution of the shoot. Below are some of the things you should do prior to the shoot:

- Distribute the scripts.
- Notify the cast members; notify the production crew.
- Confirm studio arrangements (if applicable).
- Visit and assess the on location shoot site (if applicable).
- Ensure all production equipment is or will be on hand.
- Ensure all set props, instructional materials, cue cards (if applicable), etc., are or will be on hand.
- Have contingency plans - Murphy's Law is alive and well!
- Schedule and conduct "script reading" rehearsal(s) with the cast.
- Consider conducting a dry run for the more complex productions prior to the actual shoot.

Continued on the next page

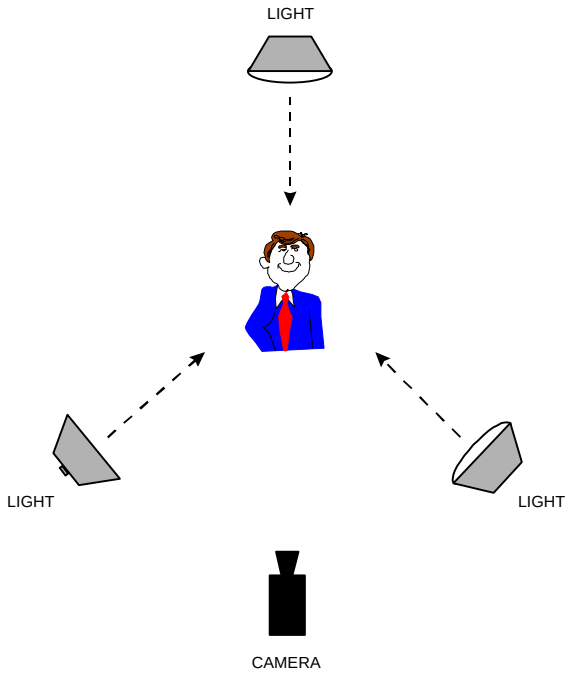
Development Considerations (continued)

Conducting the Filming

With good storyboards, a well-written script, proper preparation, and a knowledgeable director, the actual production should proceed as planned with minimal problems.

Video tips:

- Be aware of copyright laws when compiling videotapes, recording from public broadcasts, and providing multiple copies for student access. Obtain permission from copyright owners when producing videotapes that contain sound, pictures, and segments from other productions.
- Have all "on-camera" talent sign appropriate releases
- To keep viewers oriented, use the "far-shot, medium-shot, close-up-shot" sequence or "zoom-in" approach when showing an object.
- Avoid "quick" or moving camera shots. Each time the camera focuses on a new object, the viewers should be given sufficient time to be able to see and comprehend what it is that you are showing them.
- When setting up the individual shots or segments, make sure adequate lighting is provided so that the viewers will be able to recognize what is being shown. The basic *lighting triangle* set up depicted below, is one lighting method that can be used.



Continued on the next page

Development Considerations (continued)

Editing the Tape

Basic editing involves reviewing all of the videotape, selecting which shots will be used, and combining the selected segments in the desired sequence. If the entire program was already taped in the proper sequence, only minor editing should be required. Otherwise, a minimum of two videotape recorders and monitors, with a video controller linking the two recorders would be recommended to do the editing in-house.

Editing video using a PC is an option, but this would require additional video hardware (for digital/analog conversions), software, and expertise, which will be more costly.

"Voice Over" and narration can be added along with music during the editing phase. The use of photographs and other graphics can greatly enhance the "message" of the video (i.e., Ken Burns' use of photographs, narration and music in his Civil War series).

A new blank videotape should be used to make a master tape from the original. Add any desired narration and transitions between the segments to complete the instructional tape.

Implementation Considerations

Tape Reproduction

Each time a tape is copied, the image quality of the tape is reduced. Since the master tape is a copy of the original production tape, it is a second generation tape. Any duplicate master tape that is made as a precaution, would be a third generation tape.

When the videotape copies are made for distribution (normally in VHS format), you should consider using the second generation versus third generation master tape as the duplicating master. Although there is some risk involved, the quality of the reproduced tapes will be greater.

In any case, you should review one of the final distribution copies so you are aware of what the students will see.

Tape Distribution

Ensure that the distribution copies of the videotape have the version number or date printed on the label. This will help the end users in making sure they have the most current version of the tape when revisions are made.

You should also maintain an updated copy of the videotape distribution list even though you may not be responsible for the actual distribution. This list can be used as a reference for future distribution of revisions and instructional materials.

Emerging Technologies

Generally, the videotape in use today is analog video. Digital video is becoming more readily available. Examples of digital video include laser disks, and the new DVD systems. Digital video maintains better clarity when reproduced than does analog video. Digital video is also more readily distributed over computer networks than is analog video.

Pattern recognition software is enabling the searching of video presentations for specific tapes or segments.

Evaluation Considerations

Evaluation of Videotape Instruction

As with other instructional technologies, the evaluation process for videotape instruction consists of a formative, summative, and operational evaluation. If the videotape was developed as supporting instruction in conjunction with other instructional media, the evaluations may be conducted as part of the evaluation for the primary medium.

The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and its supporting handbooks.

This section addresses the special considerations for conducting evaluations of videotape instruction.

Formative Evaluation

The formative evaluation begins in the analysis phase and continues through the development phase of the ISD process. Since developmental versions (e.g., alpha and beta versions) of videotape programs are not usually produced, as is the case with computer-based programs, a validation of the video instruction would not be possible prior to the actual production of the videotape. However, a technical accuracy review of the objectives, storyboards and script can be conducted.

Following production of the videotape, individual and small group tryouts of the edited master tape can be accomplished. If deficiencies or problems are identified and cannot be corrected by additional editing, another shoot may be necessary.

Summative Evaluation

The operational tryouts for the summative evaluation of instructional videotapes should be conducted at various sites.

If the videotape was designed to be used as supporting material, it may also be necessary to present the primary instructional material for the evaluation. This would allow the video instruction to be viewed within the proper context, which will provide more meaningful and valid results.

Continued on the next page

Evaluation Considerations (continued)

Operational Evaluation

The operational evaluation is an ongoing process that is accomplished after the formative and summative evaluations. This evaluation is based on internal and external feedback data such as:

- Instructor/facilitator comments (internal)
- Student critiques (internal)
- Test results (internal)
- Inspection and evaluation reports (external)

As with the summative evaluation, the videotape should be viewed along with the primary instruction it was designed to support. Also, it may be difficult to isolate and determine the actual effectiveness of the videotape instruction from test results, unless the material tested was only provided in the videotape.

Section C

Audiotape

Analysis Considerations

Why Use Audiotape?

Audiotape can be used to reproduce real life instructional events such as lectures, tutorials, seminars, and conference presentations.

Audiotape can provide one-way aural communication between the instructor and student. The spoken word is often a richer information source than the printed word.

Audiotapes are also highly transportable and suitable for self-instruction by students at any location.

When to Use Audiotape

Audiotape can be:

- Used to deliver short course of instruction that is based on cognitive (knowledge) learning objectives or verbal skills (i.e., correspondence and language courses).
- Combined with other instructional technologies as collateral material for any type of course.

Other applications of audiotape include:

- *Recordings of real life events.* For example, lectures, presentations, guest speakers, and meetings.
- *Interviews.* For example, experts and specialists for elements of instruction.
- *Procedures or sequences.* Verbal descriptions of procedures or sequences that are part on a course of instruction.
- *Recordings.* For example, music and information sources with a strong aural content.

Since audiotapes are passive in nature, they would not be appropriate as the primary media for accomplishing learning objectives that require performance skills or a high level of interactivity and communication with others. Audiotape instruction is most effective when it is integrated with other types of media and instruction.

Continued on the next page

Analysis Considerations (continued)

Audiotape Resource Requirements and Constraints

It is important to identify and assess the audiotape resource requirements and constraints. This will help to determine the feasibility of using audiotape instruction, and whether or not the audiotapes should be produced in-house. The most common type of audiotape used for instruction is the cassette tape. This is the only type of tape that will be addressed in this section.

- **Equipment.** Minimum required equipment would include a cassette tape recorder and player, microphone, and speakers or headphones for playback.
- **Facilities.** A recording studio or "soundproof" room equipped with a cassette tape recorder to produce the taped instruction.
- **Funding.** Is there a budget? This factor will determine if outsourcing is an option.
- **Personnel.** Minimum personnel would include a SME, writer, narrator, and sound technician (if applicable). These would not necessarily be different individuals. In some situations, they may be one and the same person.
- **Time.** Is there a time limit? Although good audiotapes will still take some time to produce, they generally require less time than the other traditional media, with the possible exception of audioconferencing. Most of the time required is in the development of the script.

In-House Development or Outsource?

Unless the taped instruction will be very short, you should consider producing the tape in a sound studio with the proper equipment (in-house, rented, or contract). Anything less than professional quality sound can distract the student from concentrating on what is being said. Even though the student can replay the tape, the net effect of constant distractions is not only less effective learning taking place, but lower student motivation and interest.

Almost equally important, is the quality of the narration. Using professional narrators, although more costly, will usually require less recording and editing time (i.e., fewer retakes and less "cutting"), and be more cost-effective. If a professional narrator is not an option, it will be important to use someone who is articulate and has a pleasant, neutral voice. Everyone has probably listened to voice recordings of non-professional actors on radio or television commercials that sound unnatural (read from a prompter) or are hard to listen to because of the person's voice tone, pitch, accent, pronunciation of words, etc. Now imagine trying to listen to an hour of that type of voice recording - enough said.

Continued on the next page

Analysis Considerations (continued)

Are Audiotapes Cost-Effective?

In most cases where audio recordings can be used to accomplish the objective, cassette tapes will generally be very cost-effective. This assumes of course, a stable content environment. As computer digital audio technology continues to advance and the cost of CD recording continues to decrease, audio CDs are becoming a viable alternative medium for instruction.

Design Considerations

Determine the Objectives

Determine the specific knowledge and attitude objectives that must be achieved. Decide what it is you want to do and accomplish with the print materials.

Determine What Approach to Use

Determine whether the audiotape will be developed as the primary instructional media, or used as collateral instruction for other media.

Based on how the audiotape will be used, determine what approach will be used There are several approaches or presentation formats that can be used to deliver the instruction such as lectures, interviews, or in conjunction with programmed text.

Determine what type of test and evaluation methods should be used to measure the students' comprehension of the instruction provided. AF HDBK 36-2235, Volume 12, *Test and Measurement Handbook*, provides general guidance.

General Design Guidelines

When designing the instruction, keep focused on the objectives of the audiotape. Following are some general design guidelines:

- Plan to keep the program or program segment as short as possible. Long audio programs will lose effectiveness since it is difficult to maintain the student's attention and interest.
- As with briefings and other presentations, limit your lecture program or program segment to three major points if possible.
- Plan and design collateral activities that will require student actions or performance of tasks (i.e., hands-on activities or exercises).
- Use music and sound effects only to provide context, reinforce or reintroduce a theme, or capture, guide and hold attention.
- Determine what supporting materials, if any, will be required (e.g., outlines, quizzes, handouts with pictures, graphics, text, etc.), and how they will be used (before, during, or after). As a minimum, use supplemental materials for objects, procedures, etc., that are difficult to describe in words.
- Plan follow-on activities to reinforce the instruction provided such as group discussions, assignments, quizzes, etc.

Continued on the next page

Design Considerations (continued)

Develop a Script

The script provides the outline and guide for producing the tape. Make sure it communicates exactly what you want said and done.

The script should:

- Focus on the objectives.
- Communicate and reinforce the major points.
- Deliver the instruction in a coherent and logical sequence.
- Be written in plain conversational English.
- Identify when music, sound effects, and pauses are to be used.

When describing objects, procedures etc., without supporting visual materials, select words and examples that paint pictures and link the familiar with the unfamiliar.

Bottom line: Writing a good script takes time and practice.

Determine Who and Where to Record

Two other planning decisions will need to made:

Who to record. That is, are you going to use real people or professional narrators? If real people are used, make sure they are good speakers.

Where to record (if not already determined). Will the recording be done in a sound studio or at some other location?

- If selecting a location other than a studio, make sure the site is as "sound-proof" as possible (i.e., free from background noises such as phones, paging systems, cars, aircraft, people, heating/air conditioning units, etc.)
- Studio settings are more controlled and will reduce the possibility of having to re-record segments.

Get Approval

The script or taped rehearsals can be used in the review and approval process to get the "go-ahead" before committing studio resources for the actual recording.

Development Considerations

Preparing for the Recording

If a professional sound recording studio and technician are used, many of the following audio preparations and considerations will not be concerns or issues. They are provided as information for inexperienced personnel and in-house productions.

Audio Preparations

Determine what type of recording equipment will be used:

- Studio recording equipment.
- Audio cassette recorder.
- PC with audio recording hardware and software, and adequate hard drive space (example: 650 MB required for 72 minutes of CD audio).

If using a PC, make sure there will be someone available who is knowledgeable in capturing, recording, and editing the sound recording on the PC.

Make sure that an appropriate microphone will be used:

- Determine how many microphones will be required.
- Determine what type (unidirectional, bidirectional, or omnidirectional) and kind of microphone (table stand, handheld, etc.) is available for use.
- Select which type(s) and kind(s) of microphones will be used.
- If possible, test the microphone(s) with the recording equipment at the recording site to check audio levels and background noise.

Final Preparations for the Recording

The use of a production and equipment checklist will help to ensure smooth execution of the recording session. Below are some of the things you should do prior to the taping.

- Distribute the scripts.
- Notify the narrator(s).
- Notify the studio and sound technicians (if applicable).
- Visit and assess the recording site (if other than the studio).
- Ensure all recording equipment is or will be on hand.
- Ensure all music/sound effect tapes (if applicable) are or will be on hand.
- Have contingency plans - Murphy’s Law is alive and well!
- Schedule and conduct rehearsal(s) with the narrator(s).

Continued on the next page

Development Considerations (continued)

Conducting the Recording

With a well written script, proper equipment, and prior preparation, the actual recording should proceed with minimal problems.

Recording tips:

- Use as few microphones as possible. Each microphone used adds noise to the system.
- If there is only one microphone, and two or more narrators with different voice levels, adjust their positions either closer or farther from the microphone to maintain a proper sound balance.
- After each audio segment, keep the tape going for a short period of time to provide "blank" tape segments that can be used during editing if required to "splice-in" pauses with the same background ambiance.
- Use live sound effects and music if possible during the recording rather than trying to add them later.
- Be aware of copyright laws when recording. Obtain permission from copyright owners when producing audiotapes that contain music and sound segments from other productions or sources.

Editing the Tape

If the entire program was already taped in the proper sequence with all the desired sound effects included, only minor editing should be required. Anything more than minor editing should be done by specialists since it will normally require special equipment and expertise.

Implementation Considerations

Tape Reproduction	Audiotape reproduction should also be done with the proper equipment by qualified personnel. You should review one of the final distribution copies so you are aware of what the students will actually hear.
Tape Distribution	Ensure that the distribution copies of the audiotape have the version number or date printed on the label. This will help the end users in making sure they have the most current version of the tape when revisions are made. You should also maintain an updated copy of the distribution list even though you may not be responsible for the actual distribution. This list can be used as a reference for future distribution of revisions and instructional materials.
Emerging Technologies	Digital audio is enabling the distribution of audio (live and recorded) over computer networks. Pattern recognition software is enabling searching of audio presentations for specific topics and segments.

Evaluation Considerations

Evaluation of Audiotape Instruction

The evaluation process for audiotape instruction consists of a formative, summative, and operational evaluation. If the audiotape was developed as supporting instruction in conjunction with other instructional media, the evaluations may be conducted as part of the evaluation for the primary medium.

The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and its supporting handbooks.

This section addresses the special considerations for conducting evaluations of audiotape instruction.

Formative Evaluation

The formative evaluation begins in the analysis phase and continues through the development phase of the ISD process. Since developmental versions (e.g., alpha and beta versions) of audiotape programs are not usually produced, as is the case with computer-based programs, a validation of the audio instruction would not be possible prior to the actual production of the audiotape. However, a technical accuracy review of the objectives and script can be conducted.

Following production of the audiotape, individual and small group tryouts of the edited master tape can be accomplished. If deficiencies or problems are identified and cannot be corrected by additional editing, another audio recording session may be necessary.

Summative Evaluation

The operational tryouts for the summative evaluation of instructional audiotapes should be conducted at various sites.

If the audiotape was designed to be used as supporting material, it may also be necessary to present the primary instructional material for the evaluation. This would allow the audio instruction to be reviewed within the proper context, which will provide more meaningful and valid results.

Results of these evaluations are used to revise and finalize the audiotape instruction.

Continued on the next page

Evaluation Considerations (continued)

Operational Evaluation

The operational evaluation is an ongoing process that is accomplished after the formative and summative evaluations. This evaluation is based on internal and external feedback data such as:

- Instructor/facilitator comments (internal)
- Student critiques (internal)
- Test results (internal)
- Inspection and evaluation reports (external)

As with the summative evaluation, the audiotape should be reviewed along with the primary instruction it was designed to support. Also, it may be difficult to isolate and determine the actual effectiveness of the audiotape instruction from test results, unless the material tested was only provided in the audiotape.

General Evaluation Criteria

The following are typical evaluation criteria for audiotape instruction:

Voice quality:
- Naturalness and spontaneity
- Articulation
- Pitch

Music:
- Did it enhance or detract from narration?
- Was the amount and length appropriate?

Sound effects:
- Did it enhance or detract from narration?

Pacing:
- Smoothness of flow
- Speed of delivery

Volume settings:
- Absence of peaks and drops
- Appropriate microphone placement

Ambient noise:
- Absence of background noise/distractions

Editing:
- Absence of noticeable audio ‘cuts’ or dubbing

Sequence/format:
- Logical sequence and format of instruction

Effectiveness:
- Did the recording capture, guide, and hold attention?
- Were the objectives met?

Section D

Audioconferencing

Analysis Considerations

Why use Audioconferencing?

Traditional audioconferencing using the telephone system and audio bridging capabilities is a simple, flexible, interactive instructional delivery system. Since the telephone is widely available, the instructor can reach students at almost any location. Military use of audioconferencing is particularly cost-effective if DoD telephone networks are used.

When to Use Audioconferencing

Audioconferencing can be used:

- When real-time discussion, interaction, and feedback are required.
- To reduce the students' sense of isolation and distance.
- To provide instruction from experts at other locations.

Audioconferencing instruction is most effective when combined with other types of media.

Audioconferencing Resource Requirements and Constraints

It order to determine the feasibility of using audioconferencing as an instructional medium, you must identify and assess the resource requirements and constraints.

Although audioconferencing can also be accomplished using computer networks, this section only addresses audioconferencing using the public telephone system.

- **Equipment.** Minimum required equipment would include a telephone with audio bridging capability and a speakerphone system for larger groups.
- **Facilities.** No special facilities are required.
- **Funding.** Additional funding would be required for long distance calling fees if the DoD telephone network (DSN) would not be used.
- **Personnel.** Other than the participants, moderators may be required.
- **Time.** Comparatively, development time per hour of audioconferencing instruction, will normally be less than other media.

Design Considerations

Determine the Objectives

Determine the purpose of the audioconference and the specific learning objectives that must be achieved. Decide what it is you want to do and accomplish with the audioconference.

Determine What Approach to Use

Audioconferencing can be conducted using only audio communications between the participants, or combined with other instructional media such as print materials (text, pictures, graphics, etc.), videos, and fax machines. Based on how the audioconferencing will be conducted, several instructional approaches can be employed to include:

- Lectures
- Interviews
- Guest speaker presentations
- Student presentations
- Group discussions or debates
- Question and answer sessions

Determine what type of test and evaluation methods should be used to measure the students' comprehension of the instruction provided. AF HDBK 36-2235, Volume 12, *Test and Measurement Handbook*, provides general guidance.

General Design Guidelines

The challenge of designing an effective interactive audioconferencing course is to balance the strengths of the medium with its limitations. The greatest strength of interactive audioconferencing is its capability for interactivity; its major limitation is the absence of visual communication. To exploit its strength, design sessions that are interactive as described below. To minimize the limitations of visual cues, provide supplementary print materials in advance and 'humanize' the session by making the learners feel welcome.

Simultaneous use of WWW/Intranets and other computer networks can provide "live" video of participants and other images and data.

Continued on the next page

Design Considerations (continued)

General Design Guidelines (continued)

General design guidelines for enhancing learning and learning transfer:

- Take a student-centered approach towards instruction. Structure the lesson to provide students with the opportunity to set their own goals and objectives.
- Encourage the practical application of content, and relate subject matter to learners' needs and job tasks.
- Instruction and learning at a distance takes more time. During the design phase, be realistic about the amount of content to be presented and the assignments to be given.

Specific design guidelines are as follow:

Design for the medium of audio.

- Limit sessions to 2 hours.
- Schedule a break after 50-60 minutes of instruction.
- Limit key concepts to 3-5 per hour.
- Limit number of participants to maximize interaction; rule of thumb is 15-20 students.
- Use preview, presentation, and review techniques to provide structure.
- Ask questions and integrate student activities to facilitate interaction.

Plan interactive teaching activities every 10-15 min.

- Role-playing exercises.
- Participant presentations.
- Celebrity guest.
- Brainstorming.
- Case study.
- Q&A session.
- Learner-to-learner discussions.

Add a variety of presentation methods.

- Team teach.
- Interviews.
- Guest speakers.
- Learner-to-learner teaching.
- Panels.
- Debates.

Development Considerations

Development Techniques

When developing audioconference instruction, consider the following general techniques:

- Develop a lesson plan or 'script' of the planned session.
- Divide the content into 10-15 minute presentation segments. Connect new information with previous information.
- Plan/schedule breaks after 50-60 minutes of instruction.
- Alternate lectures with student interaction activities such as student presentations, role playing exercises, brainstorming, question/answer, etc.
- Include activities in the course syllabus/agenda that encourage independent study and student-to-student interaction.
- Develop outlines and handouts for use during the session.
- Develop quizzes or exercises to assess student comprehension of material.

Pre-Conference Package

Develop a read-ahead package for the students that contains:

- Welcome letter(s) with the instructor's biography and picture.
- Class roster with background information about each student.
- Course syllabus, agenda, ground rules and protocols.
- Readings, assignments, and bibliography.
- Handouts with graphics, charts, pictures, etc., that can be used during the session.
- Points of contact and instructions on how to connect to the conference call with phone numbers for technical assistance if disconnected.
- Critique forms.

Place read ahead materials on the Web (in addition to snail mail).
Conduct an orientation conference call prior to the first scheduled session to help acquaint learners with the medium.

- Review phone protocol.
- Ask learners to introduce themselves.
- Encourage participants to use a speakerphone or headset so that their hands will be free to take notes or to do exercises.

Learn any peculiarities to the audiobridging system before course; practice with it.
Call the technical assistance line and ask what the common problems are.

Implementation Considerations

Conducting an Orientation Session

Conduct an orientation audioconference prior to the first scheduled session to help acquaint students with the medium and procedures. During this orientation:

- Introduce yourself and advise the students on how they should address you.
- Ask the students to introduce themselves.
- Discuss what to do and who to contact if they experience any problems.
- Review the protocol for asking questions and making comments. Students should preface any comments with their name and location.
- Review any other audioconference ground rules or etiquette as applicable.
- Discuss the use of the audioconference equipment. Encourage students to use a speakerphone or headset so that their hands will be free to take notes or to do exercises during the sessions.

Conducting an Audioconferencing Session

Use the following to get an audioconferencing session started:

- Establish the conference call 10 minutes ahead of the session start time.
- As students join in, ask them questions to get them talking.
- Remind students to mute their speakerphones as appropriate.
- At the scheduled time, take attendance using a simple roll call.
- Review the agenda and clearly state the purpose of the session.
- Acknowledge and welcome any latecomers.

Use the following techniques when conducting an audioconferencing session:

- Speak in a normal conversational tone, and slow enough to be understood.
- Vary the pace of the session to maintain interest and energy.
- Engage students in discussions, debates, role playing, etc.
- Do not let one person monopolize the time.
- Ask questions and direct them at individual students when possible.
- Allow 10-15 seconds after asking a question before continuing to give the students adequate time to respond.
- Create a matrix and keep track of each student's participation.
- Do a mid-way evaluation to ensure student's requirements are being met. You can also have students measure their own progress through self-assessment items such as study questions, checklists and self-tests.
- Allow time for questions and answers at the end. Encourage students to also telephone, or E-mail you with questions and comments.
- Summarize session.
- Remind students to submit their evaluations.

Evaluation Considerations

Evaluation of Audioconferencing Instruction

The evaluation process for audioconferencing instruction consists of a formative, summative, and operational evaluation. If the audioconferencing instruction was developed to support other primary instructional media, then the instruction should be evaluated as part of the primary lesson/course evaluation.

The distance learning evaluation metrics are described in Chapter 2. The general guidelines for evaluations are contained in MIL-PRF-29612 and its supporting handbooks.

This section addresses the special considerations for conducting evaluations of audioconferences when developed as the primary instructional medium.

Formative Evaluation

The formative evaluation begins in the analysis phase and continues through the development phase of the ISD process. During the initial phases of development, the primary focus would be on the technical accuracy of the learning objectives, content, and test items.

An initial evaluation of the lesson plan/script should be accomplished. Once a 'draft' version of the audioconferencing session is developed, plan and conduct individual and small group tryouts of the instruction. General areas to evaluate include:

- Instructional session organization, structure, presentation, and format.
- Instructor knowledge, presentation and delivery techniques, and effectiveness.
- Instructional content clarity, accuracy, relevancy, currency, effectiveness, and completeness.
- Use, clarity, relevancy, and effectiveness of supporting instructional materials (e.g., text, pictures, graphics, diagrams, quizzes, etc.).
- Effectiveness of interactive student activities.
- Availability, use, reliability, and effectiveness of audioconference system equipment.
- Availability and effectiveness of technical support.
- Student comprehension and accomplishment of the learning objectives.

Continued on the next page

Evaluation Considerations (continued)

Summative Evaluation

The operational tryouts for the summative evaluation of the audioconferencing instruction should be conducted with several of the applicable sites participating at the same time.

Results of these evaluations are used to revise and finalize the audioconferencing instruction.

Operational Evaluation

The operational evaluation is an ongoing process that is accomplished after the formative and summative evaluations. This evaluation is based on internal and external feedback data such as:

- Instructor/facilitator comments (internal)
- Student critiques (internal)
- Test results (internal)
- Inspection and evaluation reports (external)

To ensure the quality of the instruction is maintained, conduct these evaluations on a regular basis. There is always room for improvement.